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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,035	09/12/2002	Nihal Wijeyesckera	20.2755	9588

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EXAMINER

ROGERS, DAVID A

ART UNIT PAPER NUMBER

2856

DATE MAILED: 01/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,035

Applicant(s)

WIJEYESEKERA ET AL.

Examiner

David A. Rogers

Art Unit

2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-23 is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 September 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1 and 11 are objected to because of the following informalities. Claims 1 and 11 are directed to methods for calibrating a subsurface gravity measurement device. However, the claims do not recite a step for calibrating. It is recommended that the claims be updated as follows:

1. A method for calibrating a subsurface gravity measurement device having a tilt meter and a gravity sensor, said method comprising:

associating tilt information produced by said gravity sensor as a function of tilt information produced by said tilt meter and at least one ~~an~~ initial correction parameter;

producing tilt data with said tilt meter, and gravity data corresponding to said tilt data with said gravity data being produced by said gravity sensor;

fitting said tilt data and said gravity data to a polynomial equation, with said polynomial equation having a plurality of initial coefficients associated therewith, said initial coefficients including information concerning said at least one initial correction parameter; ~~and~~

deriving said at least one ~~a~~ correction parameter as a function of said initial coefficients; and

calibrating said gravity measurement device using said at least one correction parameter.

11. A method for calibrating, with respect to a plumb line, a gravity measurement device having a tilt meter and a gravity sensor, said method comprising:

associating tilt information produced by said gravity sensor as a function of a relationship between tilt information produced by said tilt meter and at least one ~~an~~ initial correction parameter;

orientating said tilt meter in a plurality of differing angular positions with respect to said plumb line, defining tilt data;

measuring, with said gravity sensor, gravity information at each of said angular positions, defining gravity data;

Art Unit: 2856

fitting said tilt data and said gravity data to a polynomial equation, with said polynomial equation having a plurality of initial coefficients associated therewith, said coefficients including information concerning said at least one correction parameter;

determining values for said plurality of initial coefficients using a least-squares regression; ~~and~~ deriving said at least one correction parameter as a function of said coefficient values; and calibrating said gravity measurement device using said at least one correction parameter.

Drawings

2. The drawings are objected to because figure 2 and figure 3 show the tilt angles as symbols θ_1 and θ_2 , respectively. The applicant's disclosure utilizes tilt angles as symbols θ_x and θ_y , respectively. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application.

Specification

3. The disclosure is objected to because of the following informalities.

On page 7, the first line of the first paragraph shall be corrected to --The values for the correction parameters--.

On page 7, the fourth, twelfth, and fourteenth lines of the third paragraph shall be corrected to --parameters $k_1 \epsilon$ --.

4. The applicant is also advised that the disclosure and claims are being scanned upon receipt by the USPTO. In order to avoid any problems with typographical errors, it is suggested that the applicant submit a substitute specification that increases the font size, e.g. uses Time Roman 12 or other larger font. This will facilitate the USPTO efforts to publish the applicant when the publication fee is paid.

Allowable Subject Matter

5. Claims 1- 23 are allowed, subject to the corrections noted above.
6. The following is a statement of reasons for the indication of allowable subject matter.

The prior art discloses several variations on gravity sensors, calibration of gravity sensors, or correcting the error for gravity sensors.

For example, the article “Lacoste and Romberg Stabilized Platform Shipboard Gravity Meter” to Lacoste *et al.* discloses a correction factor that account for the tilt and horizontal velocity of the sensor. Lacoste *et al.* discloses an error value for correcting a gravity measurement in the form of $e_g = (g) \cos(e) - (a_h) \sin(e) - g$. Assuming a condition of zero horizontal velocity exists, the error becomes $e_g = -(g)(1 - \cos(e))$. The applicant’s error value is in the form $error = -(\vec{g})(1 - \cos(\theta_x) \cos(\theta_y))$. If one angle in the applicant’s method is zero, then the applicant’s equation reduces to $error = -(\vec{g})(1 - \cos(\theta_x))$, which is the same as Lacoste’s equation. However, Lacoste does not teach a method wherein a plurality of measured tilt data and gravity data are obtained and fitting using a polynomial in order to calibrate the gravity meter.

The prior art does not disclose or suggest the obtaining of a plurality of tilt measurements and a plurality of gravity measurement, and then fitting those measurements using a polynomial to get a correction parameter for calibrating a gravity meter.

Conclusion

7. This application is in condition for allowance except for the following formal matters noted above. Prosecution on the merits is closed in accordance with the practice under *Ex parte*

Art Unit: 2856

Quayle, 1935 C.D. 11, 453 O.G. 213. A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (703) 305-4451.


The examiner can normally be reached on Monday - Friday (0730 - 1600).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (703) 305-4705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

dar 

December 17, 2003


HEZRON WILLIAMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800